PETROBRAS RESEARCH CENTER'S PERFORMANCE IMPROVED WITH ELIPSE SOLUTIONS

Technologies developed by Elipse Software control cooling and power distribution systems at one of the largest oil research centers in the world, Petrobras's Cenpes

Augusto Ribeiro Mendes Filho
Elipse Software's Media Relations

Needs

Regarded as the largest oil research hub in Latin America, the Leopoldo Américo Miguez de Mello Research Center (Centro de Pesquisas Leopoldo Américo Miguez de Mello - Cenpes) is the unit responsible for Petrobras's R&D activities and basic engineering. Established in December 4, 1963, Cenpes's mission statement is to provide and anticipate innovative technological solutions for the oil industry and for other sources of energy as well.

Cenpes's new facilities, including a modern Data Processing Integrated Center (Centro Integrado de Processamento de Dados - CIPD), were opened in October 2010 at Fundão Island, in Rio de Janeiro. Occupying a 305-thousand-square-meter area, Cenpes comprises 250 laboratories, a 27-thousand-square-meter Data Processing Center (Centro de Processamento de Dados - CPD), and a Utilities Center.

For Cenpes/CIPD complex's supervisory and operational purposes, Petrobras has adopted Elipse Power and Elipse E3 solutions. These applications were developed by Petrobras's tech team in partnership with the companies hired by the consortium overseeing the working site of the Utilities Center, Cenpes's Expansion, and CIPD.

Figure 1. Cenpes's overview

Solution

The supervisory system's architecture is based on remote domains' settings, which enable visualization of process (Modbus driver) and electrical (IEC 61850 driver) systems in the same Viewer. There are also Fire Detection and Alarm Systems (Sistemas de Detecção e Alarme de Incêndio - SDAIs), which use the driver developed by Elipse to establish communication with HOCHIKI Group's FIRENET detection centers network.

With E3 screens, operators can remotely monitor and command all structures in Cenpes. Via Elipse Power, they can keep the balance between power generation and consumption, thus avoiding overloading the system in case one of its generator sources is disconnected.

Utilities Center

The Utilities Center is the heart of this enterprise, the responsible for generating and distributing energy, water, vacuum, steam, and compressed air for Cenpes. The unit was designed for providing up to 40 MW, which is enough for powering a town with 120 thousand inhabitants.

It comprises a 138 KV substation, a power measuring cabin, a Water and Sewage Treatment Station, an icy water center, and cooling towers, in addition to the buildings lodging moto generators, boilers, and chillers. The chemical products house and the compressed air and vacuum centers are also part of the Utilities Center.

This project has been developed according to the sustainability and eco-efficiency premises adopted during Cenpes's expansion process via a power co-generation system that reduces the use of energy and reuses water.
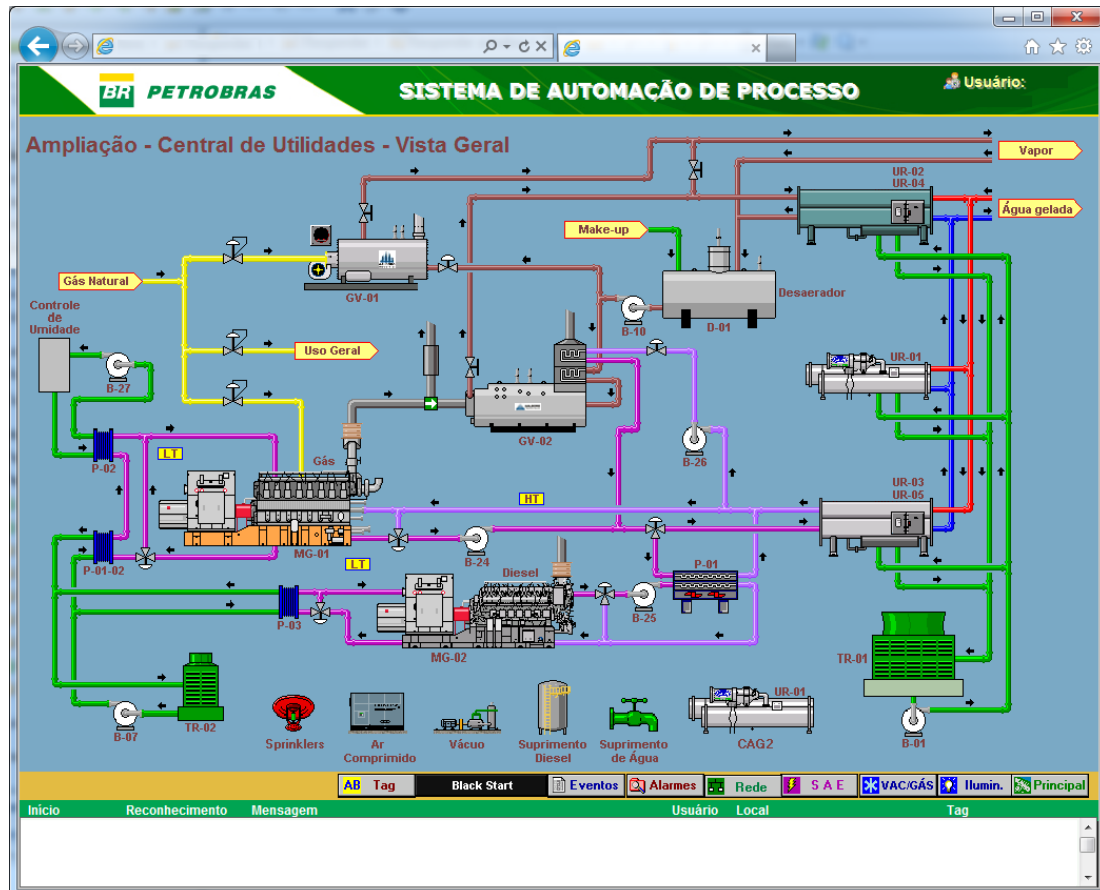

Figure 2. Utilities Center being controlled via an E3 screen

Substation and measuring cabin

The Utilities Center's current energy demand is 15 MW, which is partly produced by moto generators and partly by the public provider. The provider's energy is transmitted underground, via 138 KV transmission lines, to the entry substation, where this tension is reduced to 13.2 KV. From this total, 6 MW are distributed to Cenpes, while the remainder goes to expansion panels' room, from where it flows to the whole enterprise alongside the power supplied by the co-generation's moto generators.

Moto generators and chillers

The continuous generation of energy from gas-fueled moto generators is essential for the co-generation system. Moto generators are able to generate up to 8.6 MW; this power is

equivalent to 15 Formula 1 cars in maximum speed. The heated gases from the engine burning process are lead to the recovery boilers, which use the thermic energy from these gases to produce steam.

The daily amount of steam generated by the boilers would be the same as the one produced by 300 electric showers boiling water for 24 hours. Part of this steam is directed to the buildings in the complex, and the other part is absorbed by the chillers, which use it, alongside with the water for cooling moto generators, for producing the icy water used in the air conditioning system.

To ensure the Data Center's operational reliability in emergency situations, a second icy water central is in standby, ready to be activated at any time. The icy water system for the system's climate control generates 5.7 tons in refrigeration, which is equivalent to the cooling capacity of 5.7 thousand air conditioners.

Power failure prevention

Elipse Power is the technology behind the Selective Load Discard System (Sistema de Descarte Seletivo de Cargas - SDSC): it reduces part of the activities in the enterprise in case of any interruptions in power supply. If there is a simultaneous power outage in electricity and natural gas, distribution to the essential systems is still guaranteed via UPS system and diesel-fueled moto generators.
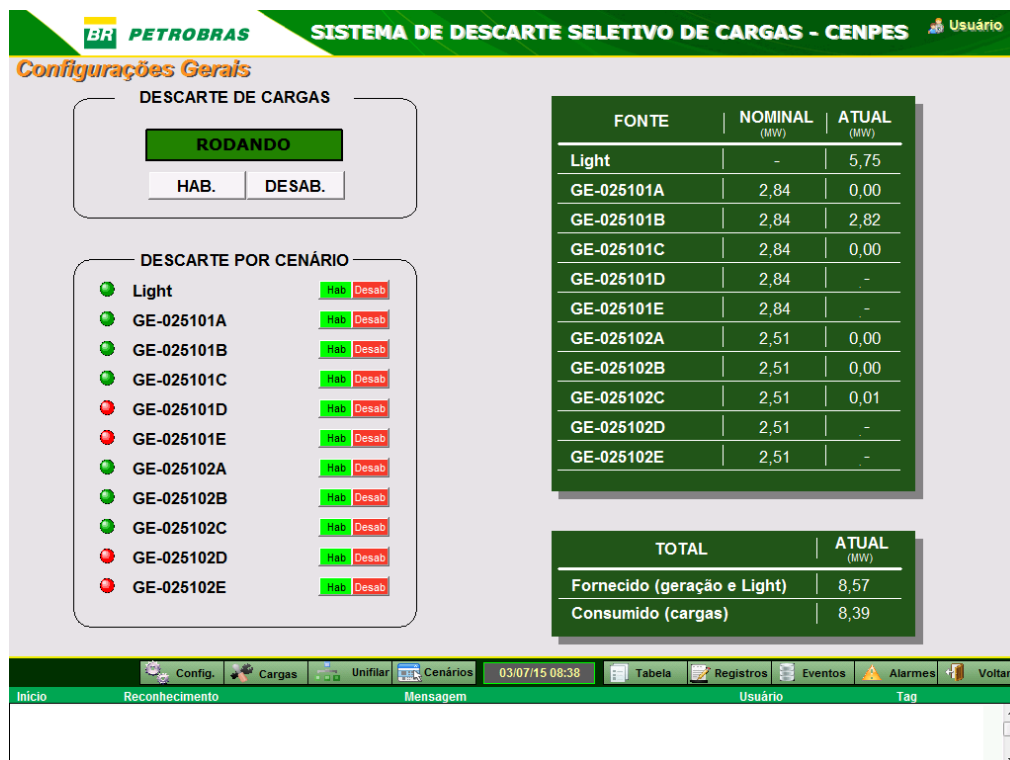

Figure 3. Load discard being controlled via an Elipse Power screen

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Benefits

- Equipment and processes are supervised at Cenpes's Utilities Center, which can generate up to 40 MW power.

- Segregated network.

- Implemented Web Viewer.

- Open architecture.

- Easily integrated with other systems.

- Power distribution can be directed to priority loads in case of simultaneous power outages in both electricity and gas.

TECHNICAL INFORMATION

Client: Petrobras

Systems integrator: Petrobras in partnership with the companies hired by the consortium overseeing the working site of the Utilities Center, Cenpes's Expansion, and CIPD.

Elipse package used: Elipse E3 and Elipse Power

Platforms: Windows 7 and Windows Server 2008 R2

Number of copies: 15

Number of I/O points: 365.519

I/O drivers: Modbus, Altus, FireNet, and IEC 61850